



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY  
GOVERNOR

1534 MAIL SERVICE CENTER, RALEIGH, N.C. 27699-1534

W. LYNDO TIPPETT  
SECRETARY

September 14, 2007

Memorandum To: File

From: Lynnise M. Hawes, P.E. *Lynnise M. Hawes*  
Feasibility Studies Engineer

Subject: Feasibility Study Re-evaluation of TIP I-4409

The initial purpose of this re-evaluation was to consider Lytle Cove Road (SR 2724) as an alternative location to the previously recommended Blue Ridge Road (SR 2500) location. However during this re-evaluation, Transportation Planning requested analysis of a third alternative approximately half way between the Blue Ridge Road and Lytle Cove Road locations. The traffic analysis associated with the alternatives is described below.

**No Build**

**Traffic Volumes**

Roadway	2007 vpd	2035 vpd
SR 2740 (Patton Cove Road)	18,500	33,400
SR 2724 (Lytle Cove Road)	2,200	3,000
SR 2500 (Blue Ridge Road)	4,100	6,300
NC 9	14,800	20,200

**Two-lane Analysis**

Roadway	2007 LOS	2035 LOS
SR 2724 (Lytle Cove Road)	E	E
SR 2500 (Blue Ridge Road)	E	E

**Freeway Analysis**

Roadway	2007 LOS	2035 LOS
I-40	C	D

## No Build

### Ramp Analysis

Roadway	2007 LOS	2035 LOS
SR 2740 (Patton Cove Road)	C	F
NC 9	C	D

### Ramp Terminal Intersection Analysis

Roadway	2007 LOS	2035 LOS
SR 2740 (Patton Cove Road)	C	F
NC 9	C	F

## Alternative 1 - Option A

(Interchange at Blue Ridge Road and no interchange at US 70)

### Traffic Volumes

Roadway	2007 vpd	2035 vpd
SR 2740 (Patton Cove Road)	13,500	24,300
SR 2724 (Lytle Cove Road)	2,200	3,000
SR 2500 (Blue Ridge Road)	13,100	21,400
NC 9	11,600	15,800

### Two-lane Analysis

Roadway	2007 LOS	2035 LOS
SR 2500 (Blue Ridge Road)	E	E

### Freeway Analysis

Roadway	2007 LOS	2035 LOS
I-40	C	D

**Alternative 1 - Option A  
(Interchange at Blue Ridge Road and no interchange at US 70)**

**Ramp Analysis**

Roadway	2007 LOS	2035 LOS
SR 2740 (Patton Cove Road)	C	F
SR 2500 (Blue Ridge Road)	C	D
NC 9	B	C

**Ramp Terminal Intersection Analysis**

Roadway	2007 LOS	2035 LOS
SR 2740 (Patton Cove Road)	C	D
NC 9	B	D
SR 2500 (Blue Ridge Road)	B	D

In the 2035 design year, approximately 13,500 vpd are diverted from Patton Cove Road and NC 9. In the 2035 design year, the traffic on Blue Ridge Road increases by approximately 15,100 vpd. It is anticipated that this portion of Blue Ridge Road will need to be widened to a four-lane divided section in order to accommodate the 2035 design year traffic volumes. In addition, we are concerned with the wider cross-section's at grade crossing with the Southern Railroad which parallels US 70. Alternative 1 – Option B below includes a grade separation with the Southern Railroad and US 70 and an interchange at US 70 to address these concerns.

**Alternative 1 - Option B  
(Interchanges at Blue Ridge Road and US 70)**

**Traffic Volumes**

Roadway	2007 vpd	2035 vpd
SR 2740 (Patton Cove Road)	13,500	24,300
SR 2724 (Lytle Cove Road)	2,200	3,000
SR 2500 (Blue Ridge Road)	13,100	21,400
NC 9	11,600	15,800

**Two-lane Analysis**

Roadway	2007 LOS	2035 LOS
SR 2500 (Blue Ridge Road)	E	E

**Alternative 1 - Option B  
(Interchanges at Blue Ridge Road and US 70)**

**Freeway Analysis**

Roadway	2007 LOS	2035 LOS
I-40	C	D

**Ramp Analysis**

Roadway	2007 LOS	2035 LOS
SR 2740 (Patton Cove Road)	C	F
SR 2500 (Blue Ridge Road)	C	D
NC 9	B	C

**Ramp Terminal Intersection Analysis**

Roadway	2007 LOS	2035 LOS
SR 2740 (Patton Cove Road)	C	D
NC 9	B	D
SR 2500 (Blue Ridge Road)	B	D
US 70	B	C

In the 2035 design year, approximately 13,500 vpd are diverted from Patton Cove Road and NC 9. In the 2035 design year, the traffic on Blue Ridge Road increases by approximately 15,100 vpd. It is projected that Blue Ridge Road will not be able to accommodate the 2035 design traffic. Blue Ridge Road will need to be widened to a four-lane divided section.

**Alternative 2 (Interchange at Lytle Cove Road)**

**Traffic Volumes**

Roadway	2007 vpd	2035 vpd
SR 2740 (Patton Cove Road)	11,800	24,200
SR 2724 (Lytle Cove Road)	12,400	17,400
SR 2500 (Blue Ridge Road)	4,100	6,300
NC 9	11,900	16,100

**Two-lane Analysis**

Roadway	2007 LOS	2035 LOS
SR 2724 (Lytle Cove Road)	E	E

## Alternative 2 (Interchange at Lytle Cove Road)

### Freeway Analysis

Roadway	2007 LOS	2035 LOS
I-40	C	E

### Ramp Analysis

Roadway	2007 LOS	2035 LOS
SR 2740 (Patton Cove Road)	B	C
SR 2724 (Lytle Cove Road)	B	D
NC 9	B	C

### Ramp Terminal Intersection Analysis

Roadway	2007 LOS	2035 LOS
SR 2740 (Patton Cove Road)	C	D
NC 9	B	D
SR 2724 (Lytle Cove Road)	C	C

In the 2035 design year, approximately 13,300 vpd are diverted from Patton Cove Road and NC 9. In the 2035 design year, the traffic on Lytle Cove Road increases by approximately 14,400 vpd. It is anticipated that this portion of Lytle Cove Road will need to be widened to a four-lane divided section in order to accommodate the 2035 design year traffic volumes. It is anticipated that the existing four-lane section of I-40 will need to be widened to a six-lane divided section in order to accommodate the 2035 design year traffic volumes. In addition, we have significant concerns about the traffic safety and operations of an interchange in this location due to the inadequate spacing between I-40, US 70, and the railroad. (See the attached September 6, 2006 Memorandum.)

## Alternative 3 - Option A (Interchange on New Location)

### Traffic Volumes

Roadway	2007 vpd	2035 vpd
SR 2740 (Patton Cove Road)	11,500	28,200
SR 2724 (Lytle Cove Road)	2,200	3,000
SR 2500 (Blue Ridge Road)	4,100	6,300
NC 9	13,700	18,700
Proposed Connector	4,800	7,700

### Alternative 3 - Option A (Interchange on New Location)

#### Two-lane Analysis

Roadway	2007 LOS	2035 LOS
Proposed Connector	D	E

#### Freeway Analysis

Roadway	2007 LOS	2035 LOS
I-40	C	E

#### Ramp Analysis

Roadway	2007 LOS	2035 LOS
SR 2740 (Patton Cove Road)	B	C
NC 9	B	C
Proposed Connector	B	C

#### Ramp Terminal Intersection Analysis

Roadway	2007 LOS	2035 LOS
SR 2740 (Patton Cove Road)	C	D
NC 9	B	D
US 70	B	C

In the 2035 design year, approximately 6,700 vpd are diverted from Patton Cove Road and NC 9. It is anticipated that the proposed connector will need to be a four-lane divided section in order to accommodate the 2035 design year traffic volumes. It is also anticipated that the existing four-lane section of I-40 will need to be widened to a six-lane divided section in order to accommodate the 2035 design year traffic volumes.

### Alternative 3 - Option B (Interchange on New Location)

#### Traffic Volumes

Roadway	2007 vpd	2035 vpd
SR 2740 (Patton Cove Road)	14,300	26,800
SR 2724 (Lytle Cove Road)	2,200	3,000
SR 2500 (Blue Ridge Road)	4,100	6,300
NC 9	13,100	18,400
Proposed Connector	6,400	9,400

## Alternative 3 - Option B (Interchange on New Location)

### Two-lane Analysis

Roadway	2007 LOS	2035 LOS
Proposed Connector	E	E

### Freeway Analysis

Roadway	2007 LOS	2035 LOS
I-40	C	E

### Ramp Analysis

Roadway	2007 LOS	2035 LOS
SR 2740 (Patton Cove Road)	B	C
NC 9	B	C
Proposed Connector	B	C

### Ramp Terminal Intersection Analysis

Roadway	2007 LOS	2035 LOS
SR 2740 (Patton Cove Road)	C	D
NC 9	B	D
US 70	B	B

In the 2035 design year, approximately 8,400 vpd are diverted from Patton Cove Road and NC 9. It is anticipated that the proposed connector will need to be a four-lane divided section. It is projected that the existing four-lane section of I-40 will not be able to accommodate the 2035 design year traffic. I-40 will need to be widened to a six-lane divided section.

### Conclusions

SR 2500 (Blue Ridge Road) is the preferred alternative because it diverts the most traffic from SR 2724 (Patton Cove Road) and NC 9 interchanges. However, the Blue Ridge Road alternative will require a four-lane divided section between I-40 and US 70 as well as an interchange at US 70 to accommodate the 2035 design year traffic projections. If in the future it is determined to proceed with this project, the preliminary design and the associated cost estimates will need to be revised accordingly. It should be noted that the cost estimates contained within the September 6, 2006 Memorandum do not contain the geometry needed to accommodate the updated projected 2035 traffic volumes (dated May 21, 2007).



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY  
GOVERNOR

W. LYNDO TIPPETT  
SECRETARY

September 6, 2006

Memorandum To: J. J. Swain, Jr. P.E.  
Division Engineer, Division 13

From: Derrick W. Lewis, P.E.  
Feasibility Studies Unit Head

Subject: Preliminary Findings of Feasibility Study Re-evaluation of TIP I-4409

As requested, we are providing the preliminary findings of the re-evaluation of TIP project I-4409. The initial purpose of this re-evaluation was to consider Lytle Cove Road (SR 2724) as an alternative location to the previously recommended Blue Ridge Road (SR 2500) location. However during this re-evaluation, Transportation Planning requested analysis of a third alternative approximately half way between the Blue Ridge Road and Lytle Cove Road locations. The description and costs associated with the alternatives are described below.

**Alternative 1 (Blue Ridge Road):** This alternative proposes converting the existing grade separation into a partial cloverleaf interchange. Included in the costs below are the widening of SR 2500 (Blue Ridge Road) from US 70 to just south of the proposed interchange to a three-lane curb and gutter section, with 12' travel lanes on 100' right-of-way, the upgrading of SR 2500 from the proposed interchange to SR 1713 to 12' travel lanes and 8' shoulders (4' of which are paved) on 100' right-of-way, and the construction of a new bridge structure over the Swannanoa River.

It is anticipated that there will be thirty-three (33) residences and nine (9) businesses relocated due to this alternative. The total cost of this alternative, including construction and right-of-way, is estimated to be \$17,400,000.

Construction.....	\$9,600,000
<u>Right-of-Way.....</u>	<u>\$7,800,000</u>
Total Cost	\$17,400,000

**Alternative 2 (Lytle Cove Road):** This alternative proposes converting the existing grade separation into a diamond interchange. Included in the costs below is the widening of SR 2724 (Lytle Cove Road) from US 70 to SR 2726 to a three-lane curb and gutter section, with 12' travel lanes on 100' right-of-way and the relocation of SR 2725.

It is anticipated that there will be twenty (20) residences and five (5) businesses relocated due to this alternative. The total cost of this alternative, including construction and right-of-way, is estimated to be \$15,600,000.

Construction.....	\$8,400,000
<u>Right-of-Way.....</u>	<u>\$7,200,000</u>
Total Cost.....	\$15,600,000

**Alternative 3 - Option A:** This alternative proposes the new construction of a trumpet interchange on I-40, a one quadrant interchange on US 70, and a connector from I-40 to US 70. The proposed connector shall be a two-lane bridge structure with 12' travel lanes on 150' right-of-way.

It is anticipated that there will be three (3) residences and four (4) businesses relocated due to this alternative. The total cost of this alternative, including construction and right-of-way, is estimated to be \$30,600,000.

Construction.....	\$26,400,000
<u>Right-of-Way.....</u>	<u>\$4,200,000</u>
Total Cost.....	\$30,600,000

**Alternative 3 - Option B:** This alternative proposes the new construction of a trumpet interchange on I-40, a two-quadrant interchange on US 70, and a connector from I-40 to SR 2435. The proposed connector from I-40 to US 70 shall be a two-lane bridge structure with 12' travel lanes on 150' right-of-way. The proposed connector from US 70 to SR 2435 shall be a two-lane shoulder section, with 12' travel lanes and 8' shoulders (4' of which are paved) on 100' right-of-way.

It is anticipated that there will be five (5) residences and seven (7) businesses relocated due to this alternative. The total cost of this alternative, including construction and right-of-way, is estimated to be \$33,400,000.

Construction.....	\$27,800,000
<u>Right-of-Way.....</u>	<u>\$5,600,000</u>
Total Cost.....	\$33,400,000

J.J. Swain, Jr. P.E.  
September 6, 2006  
Page 3

This re-evaluation is limited to feasibility study design, traffic operational analysis and costs associated with these alternatives. This work is preliminary and not a product of comprehensive environmental or design evaluations. Transportation Planning will evaluate the environmental impacts associated with these alternatives during their update of the French Broad River MPO Comprehensive Transportation Plan. Our traffic analysis will not be complete until we receive the traffic projections for this project.

### Preliminary Findings

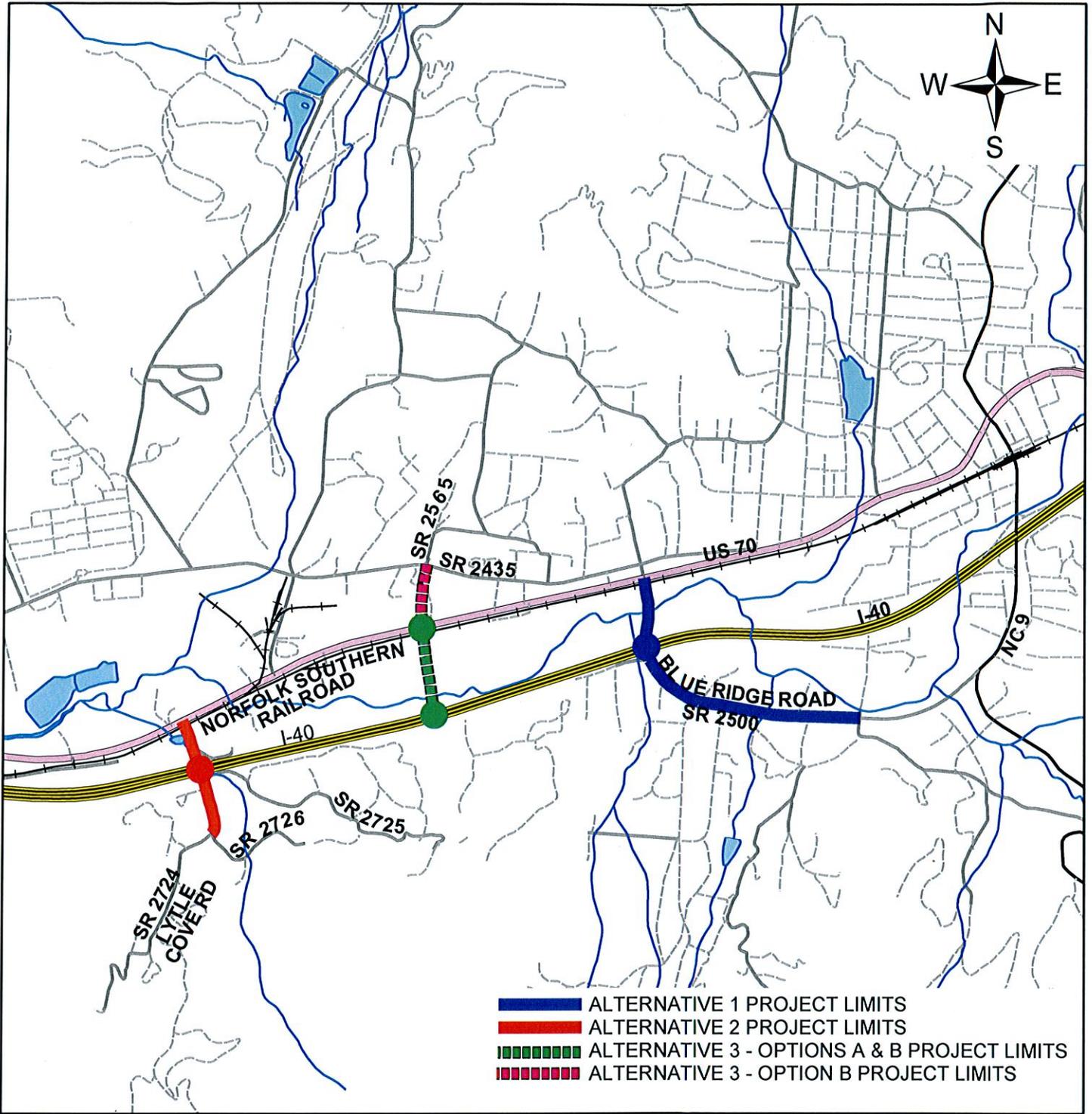
Based on the limited information available, **we do not consider an interchange at Lytle Cove Road to be an acceptable alternative because of traffic safety and operational concerns with inadequate spacing between I-40, US 70 and the railroad.** While the other alternatives are still considered feasible, both Alternative 3 Option A and Option B have increased environmental permitting concerns because of the new crossing of the Swannanoa River and its floodway, and are significantly more expensive than Alternative 1 at Blue Ridge Road. While environmental permits are also anticipated on Alternative 1, upgrading the existing Blue Ridge Road crossing of the Swannanoa River should be less of a concern than providing a new crossing. . Given the limited information available, **it appears that Alternative 1 is still the most cost effective and practical improvement for this project.** Once the projected traffic volumes are received, we will analyze the alternatives, verify that they function acceptably, ensure there are no adverse operational impacts to I-40, and validate the preferred alternative.

If you should have further questions or additional information is needed, please do not hesitate to contact Lynnise Hawes or myself at 733-2039.

DWL/dl&lh

ATT: Project Map

cc: Alan Thornburg, Member, Board of Transportation  
Calvin Leggett, P.E.  
Al Avant  
Van Argabright, P.E.  
Mike Bruff, P.E.,  
Alena Cook, P.E.



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
PROGRAM DEVELOPMENT BRANCH

I-4409REV

I-40/SR 2500 (BLUE RIDGE ROAD) & I-40/SR 2724 (LYTLE COVE ROAD)  
COMPARE FOR A POTENTIAL NEW INTERCHANGE LOCATION

BLACK MOUNTAIN, BUNCOMBE COUNTY

DIVISION 13 FIGURE 1